

PTC® Live Global

PTC MathCAD and Workgroup Manager: Implementation in a Multi-Org System

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The Engineering Services Contract (ESC) at Kennedy Space Center (KSC) provides services to NASA in respect to flight and ground systems design and development. To aid this effort, the ESC Principal Engineering Technology Development Group investigates and provides the necessary tools, aid, and best practice methodologies required for efficient, optimized design and process development. The team is responsible for configuring and implementing software, along with training, documentation, and administering standards. The team—comprising of 5 members—supports over 200 engineers and design specialists with the use of Windchill, Creo Parametric, NX, AutoCAD, and a variety of other design and analysis tools.



- **Design Analysis Report**
 - One Per Sub-system
 - Very Large
 - 979 pages
 - 36 pages of actual report
 - Manually created in Word
 - Manually published to PDF
 - Multiple volumes
 - Example 340 Figures, 45 Tables
 - Contains All Analysis Information
 - FEM
 - Mathcad
 - Hand Calculations
 - Sketches
 - Continuous Updates
 - Difficult to find Information



- Simplify creation of the DAR
 - Utilize available Resources
 - Windchill Objects
 - Word
 - Pics/Scanned Docs
 - MathCAD
 - Work Group Manager
 - Easy Methodology
 - User Experience
 - Administration
 - Structured Implementation
 - Versioned
 - Reportable
 - Life Cycle Managed

- **Functionality OOTB**
 - Documents
 - Attachments
 - Document Structures
- **New Solutions**
 - MathCAD Objects

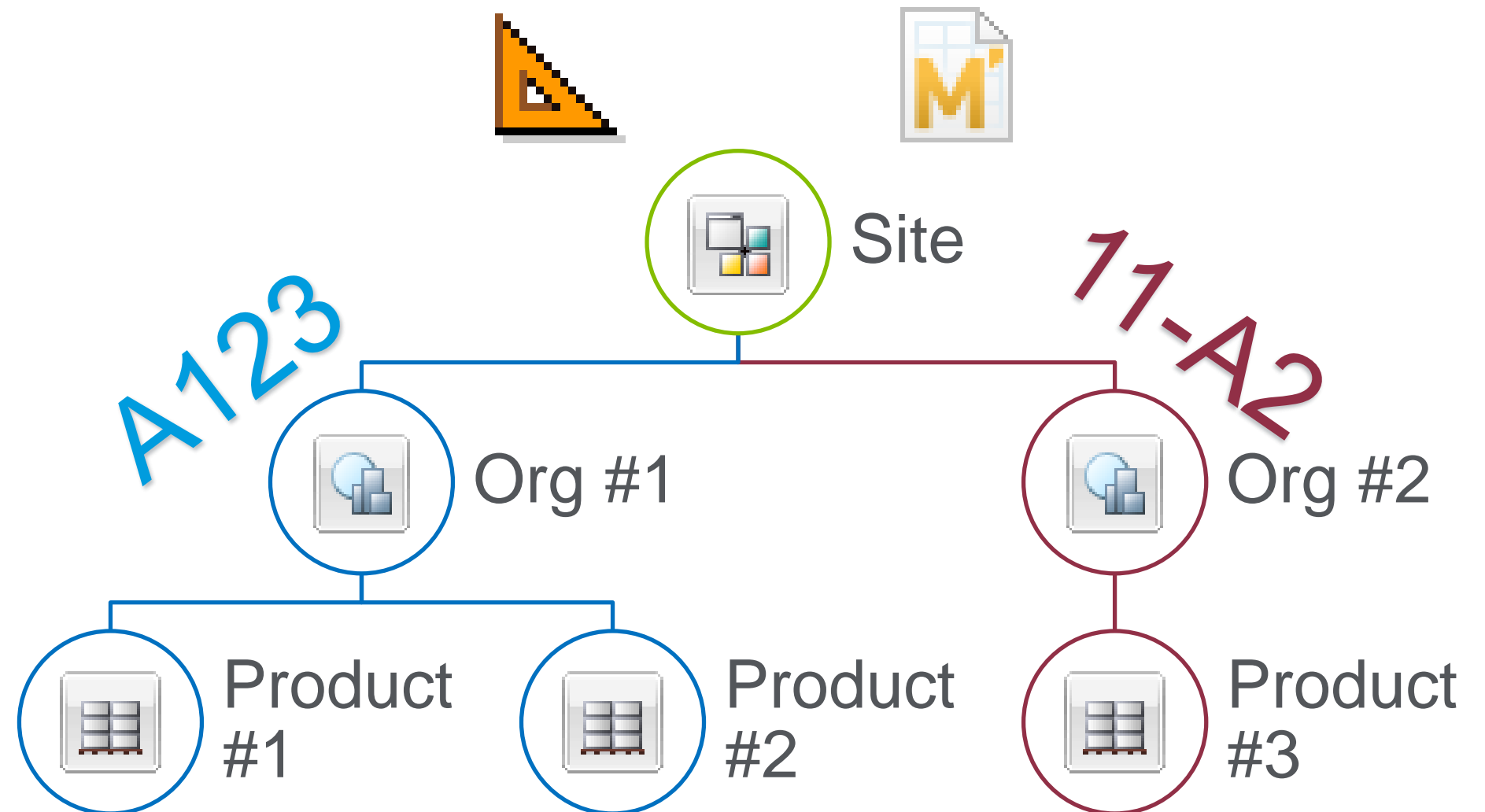
Challenges

- Able to assign numbering scheme
- Able to assign unique workflows and Life Cycles
- Add Attributes to aid in information gathering
- Removes need of network shares and storage inconsistencies

Solutions

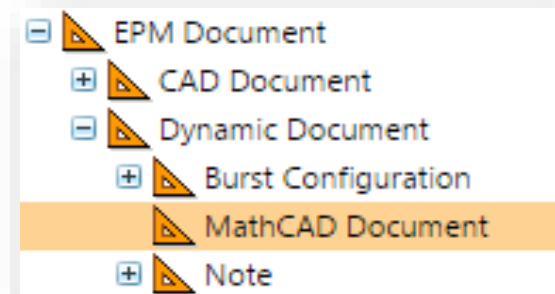
- Multiple Departments w/ different schemas
 - OIR at Org Level
- Multiple Departments w/ different schemas
 - Soft Type EPM Document Objects.
- Multiple Departments w/ different schemas
 - Soft Type Specific Attributes
- Implement Integrated WGM

- Several Directorates with Design Functions on KSC
- Different Standards for each
- Similar Objects but not exact



Development and Implementation

- Soft Type required in order to segregate type from “Dynamic Document”
 - Dynamic Document currently defines ALL Non-CAD objects
 - Soft type grants ability to have unique OIRs, Life Cycles, Workflows, etc
- Created MathCAD Document as child of the “Dynamic Document” at Site Level
 - Enables soft typing for all Organizations
 - Additional typing and Org-specific configurations to then be built within their specific context



A screenshot of the 'Type - MathCAD Document' configuration form in PTC Live Global. The form is titled 'Type - MathCAD Document' and includes an 'Actions' dropdown. The fields are as follows:

- Internal Name:** gov.nasa.ksc.MATHCADDDOC
- Display Name:** MathCAD Document
- Description:** MathCAD Document
- * Instantiable:** Yes (selected)
- Sort Order:** 1
- Icon:** wt/clients/images/epmdoc.gif
- The Default Type of Part to Create:**
- The Default Classification of Part:**
- Subtypeable:** Yes
- Owning Organization:** Site

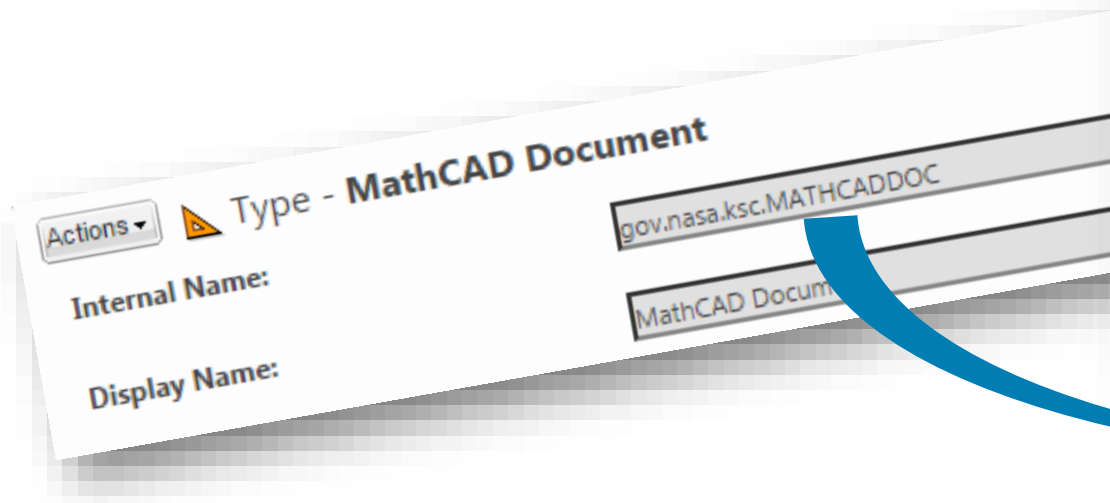
- With Soft Type created, EPMDDefaultSoftType.XML file needs to be updated
 - Creates and links Windchill “MathCAD” object (OOTB) with the newly created Soft Type
 - File found in Codebase
 - Store in wtSafeArea

Default (Before)

```
<AuthAppSoftTypeInfo authAppName="MATHCAD">
  <ObjectClassInfo classType="EPMDocument">
    <ObjectTypeInfo type="*">
      <SoftTypeInfo softTypeId="{internet_domain_name}.DynamicDocument"/>
      <SoftTypeInfo subType="*" softTypeId="{internet_domain_name}.DynamicDocument"/>
    </ObjectTypeInfo>
  </ObjectClassInfo>
</AuthAppSoftTypeInfo>
```

After Modifications

```
<AuthAppSoftTypeInfo authAppName="MATHCAD">
  <ObjectClassInfo classType="EPMDocument">
    <ObjectTypeInfo type="*">
      <SoftTypeInfo softTypeId="{internet_domain_name}.MATHCADDOC"/>
      <SoftTypeInfo subType="*" softTypeId="{internet_domain_name}.MATHCADDOC"/>
    </ObjectTypeInfo>
  </ObjectClassInfo>
</AuthAppSoftTypeInfo>
```



- MathCAD OIRs can now be created and deployed at each Organization
 - Allows unique numbering scheme
 - Can call different Life Cycle
 - Workflow can be implemented (if needed)
- Reminders
 - Create a new schema
 - Create sequence generator for automated number generator (if needed)

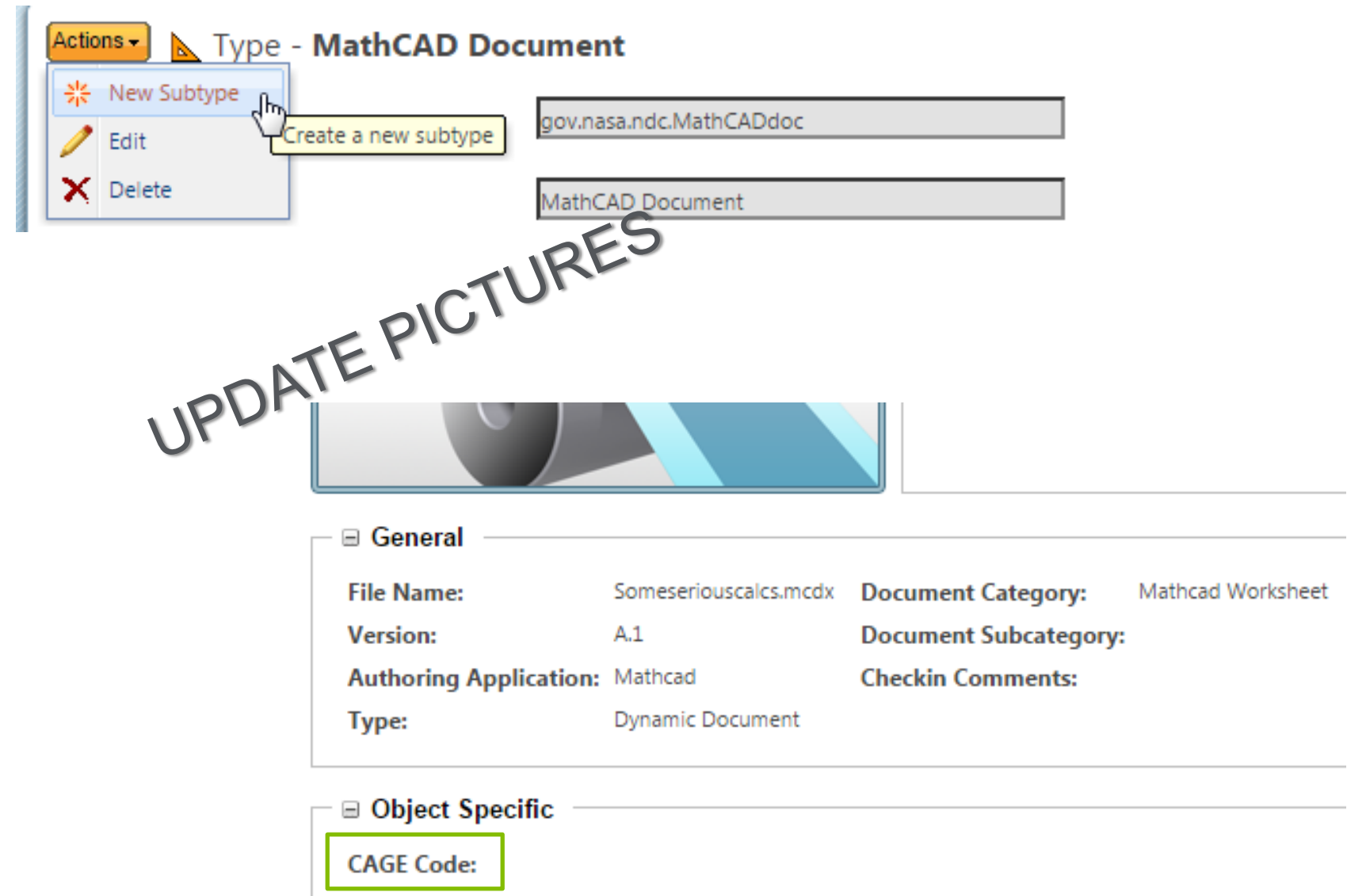
```
<AttributeValues objType="wt.epm.EPMDocument|gov.nasa.ksc.MATHCADDOC">

  <!-- set the folder -->
  <AttrValue id="folder.id" algorithm="com.ptc.core.foundation.folder.server.impl.FolderPathAttributeAlgorithm">
    <Arg>/Default</Arg>
  </AttrValue>

  <!-- set the lifecycle -->
  <AttrValue id="lifeCycle.id" algorithm="com.ptc.core.foundation.lifecycle.server.impl.LifeCycleTemplateAttributeAlgorithm">
    <Arg>
      <!-- Translation of the word "Basic" must be the same as the translation done in commonLifeCycles.xml -->
      <?loc-begin key="BASIC_LIFECYCLE_NAME" maxlen="30" match="commonLifeCycles.xml:BASIC_LIFECYCLE_NAME"?>PBO<?loc-end?>
    </Arg>
  </AttrValue>

  <!-- set the number to a generated number -->
  <AttrValue id="number" algorithm="com.ptc.windchill.enterprise.revisionControlled.server.impl.NumberGenerator">
    <Arg>KSITE</Arg>
    <Arg>{GEN:wt.enterprise.SequenceGenerator:EPM_seq:10:0}</Arg>
  </AttrValue>
</AttributeValues>
```

- Additional “children” soft types of the MathCAD object can now be created
 - Done in Organizations requiring additional/different attributes
 - Rolled out with configured layouts
 - Can remove undesired attributes
 - Can reorganize page display



Actions ▾ Type - **MathCAD Document**

New Subtype (selected)
Edit
Delete

gov.nasa.ndc.MathCADdoc

MathCAD Document

General

File Name:	Someseriouscalcs.mcdx	Document Category:	Mathcad Worksheet
Version:	A.1	Document Subcategory:	
Authoring Application:	Mathcad	Checkin Comments:	
Type:	Dynamic Document		

Object Specific

CAGE Code:

Demo

- Your feedback is valuable
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